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REPORT ON WATER POLLUTION, OUACHITA RIVER BASIN,

Public Health Service
Little Rock, Arkansas

1952

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REPORT ON WATER POLLUTION

OUACHITA RIVER BASIN

1952

PROPERTY OF:
U.S. DEPT. OF THE INTERIOR
FWPCA - Reference Service
633 Indiana Avenue, N.W.

Prepared by

FEDERAL SECURITY AGENCY
Public Health Service
Division of Water Pollution Control
Southwest-Lower Mississippi Drainage Basins Office

in cooperation with

Arkansas Water Pollution Control Commission

and

Louisiana Stream Control Commission

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SUMMARY

The water resources in the Ouachita Basin are an important asset to the area and are used principally for public and industrial water supplies; agriculture, including irrigation and livestock watering; fish and wildlife propogation; recreational activities; hydroelectric power production; and for final disposal of wastes.

There is a total of 89 municipal water supplies in the basin, serving 442,000 persons with an average of 38.4 million gallons of water daily. Twelve supplies, 11 in Arkansas and one in Louisiana, are derived from surface sources and serve 267,000 persons with an average of 23.4 million gallons daily. Included is the City of Little Rock; although located outside the Ouachita Basin, it obtains its water supply from Lake Winona, an impoundment on a tributary of the Ouachita. It serves 155,000 persons in the metropolitian area with a daily average of 13 million gallons. Seventy-seven municipalities use underground sources to supply 175,000 persons with an average of 15.5 million gallons daily.

Industrial water supplies are derived from both surface and ground water sources. Information regarding the total water use and relative importance of the sources utilized is fairly adequate for an estimate of use by industry.

Irrigation is one of the important water uses in the basin. Considerable acreage is irrigated in the eastern section of the basin from Bayou Bartholomew and from other surface and ground water sources. The use of the waters in the basin for livestock watering is regarded as an important water use associated with agriculture.

The recreational opportunities offered by the streams and impoundments contribute significantly to the well-being of the people in the basin. Sport fishing is practiced in the several impoundments, and along the main stem of the Ouachita and on most of the tributary streams.

Oil well brine waste from numerous oil fields located in the west-central part of the basin adds significantly to the chloride content of the waters in the lower Ouachita River system. Land-owners in the basin have brought many suits against oil field operators for damages to vegetation and lands caused by leakage and overflow from waste disposal pits.

Pollution from municipal sources is generally regarded as a local problem, affecting limited sections of the streams. There are 59 municipalities in the basin with sewerage facilities serving a total connected population of 221,600. This includes Hampton, Arkansas, which is building a sewerage system. The pollution load reaching the watercourses from the 59 municipalities involved is estimated to be equivalent to the untreated wastes from 148,000 persons (population equivalent). Industrial wastes discharged into municipal sewer systems from numerous industrial plants are considered as part of the municipal waste load for purposes of this report.

Waste treatment plants are provided in 43 of the 59 municipalities with sewerage systems. Fifty-one plants in these municipalities provide various degrees of treatment for wastes from a total population of 148,700 persons. Thirty-four of these plants provide primary treatment for 75,600 persons, and 16 plants provide secondary treatment for 79,100 persons. Sixteen municipalities with a sewered population of 66,900 persons have no existing treatment facilities. The pollution load originating from municipal sources is reduced by about 33 percent in the existing treatment plants operated in the basin.

Information regarding the adequacy of existing municipal waste treatment plants shows that 37 of the 51 plants do not have adequate capacity, and 30 plants are not operated satisfactorily.

In recent years there has been some progress in construction of municipal waste treatment facilities for the abatement of pollution in the basin. During the last five-year period, 1947-1951, four plants in Arkansas and two in Louisiana were completed to serve a total population of 47,800 persons. Five plants are presently under construction in Arkansas.

Although the majority of municipalities in the basin has some type of waste treatment facility, there is indicated a need for new plants and for expansion or improvement of a substantial number of plants. Nine municipalities, having a sewered population of 51,800 persons, need new plants. Thirteen plants serving 60,600 persons need enlargements or additions to the existing plants, and 13 existing plants serving 46,300 persons need complete replacements. Twenty-seven communities with a sewered population of 62,900 persons either have adequate treatment facilities or treatment is not needed. Seven communities in Louisiana are included in this latter category. Thirteen of the needed projects are in the active planning stage, one has final plans approved, and five projects are under construction. No action is indicated for 16 other needed projects.

Oil fields and refineries comprise the principal sources of industrial pollution in the basin. There are 124 known industrial sources of pollution which discharge wastes through separate outlets; 77 are oil fields; and 6 are oil processing plants. Incomplete data regarding the nature and magnitude of the wastes discharged from industrial sources precludes an estimate of the pollution load reaching the watercourses of the basin.

Information regarding existing waste treatment facilities is available for 72 oil fields and two oil processing plants. Methods of waste disposal for five oil fields and four oil processing plants are undetermined.

The brine disposal systems for 41 oil fields and waste treatment facilities for two refineries are regarded adequate.

Pollution abatement needs for sources of industrial wastes include 20 new projects and 20 enlargements or additions to existing facilities. The needs for 30 sources are undetermined, and 54 sources need no projects. Six of the needed projects are in the active planning stage and two projects are under construction.

Natural pollution of the waters in the basin is not extensive. Damages have occurred due to the formation of sulfuric acid from pyrites around Magnet Cove and Malvern, Arkansas, and from lignites in certain other areas.

Some of the streams carry significant quantities of silt along their courses. U. S. Engineer Reports indicate that dredging and snag removal is an annual expense. It is reported that 85 percent of the annual cost is for dredging. The bulk of the sediment deposits is due to land and stream bank erosion. However, the damages to the waters of the basin, due to silt content, are not of primary concern.

Benefits to be derived from pollution prevention and abatement can readily be assigned to water supplies, agricultural use, and recreational activities. Of equal or greater importance are the intangible and indirect benefits to public health, to the general well-being of the residents, and to general aesthetic quality of the important surface water resources of the basin.

Water pollution control activities in Arkansas are administered by the Water Pollution Control Commission within the State Board of Health. The Water Pollution Control Commission was created by Act 472 of the 1949 Arkansas General Assembly. The Act authorizes the study and control of pollution in waters of the State. The Chief Sanitary Engineer of the State Board of Health serves as the Technical Secretary of the Water Pollution Control Commission, and as such, is the administrator of all pollution control activities.

Water pollution control activities in Louisiana are administered by the Stream Control Commission, which was established in 1940. The Commissioner of the Department of Wildlife and Fisheries is ex-officio chairman of the Commission. The Commissioner is responsible for the enforcement and administration of the rules, regulations, and orders of the Commission. The agents and enforcement officers of the Commission of Wildlife and Fisheries are ex-officio agents and enforcement officers of the Commission.

Estimates based on available cost data indicate that the initial cost for providing municipal waste treatment facilities in the basin will be approximately $4,500,000. Considered in the estimate is the cost for providing treatment of industrial wastes discharged into municipal sewer systems. The estimate, however, does not include the cost for projects needed by industries discharging wastes directly to the watercourses.

CONCLUSIONS

(1) The water resources of the Ouachita River Basin are utilized for many and varied uses. In many local areas, limited water supplies of suitable quality emphasize the importance of pollution control to protect and improve the available waters for present and future beneficial uses.

(2) Pollution from municipal sources is generally regarded as a local problem except where it complements serious industrial waste pollution. Wastes from oil fields in the west-central portion of the basin, and from pulp and paper mills located along the middle reach of the Ouachita, contribute significantly to the degradation of the receiving streams. Pollution from natural sources, principally silt, is a minor problem in the basin.

(3) About 70 percent of the municipal sources and 60 percent of the industrial sources of pollution have some type of waste treatment or control facility. A large percentage of the facilities, however, are generally inadequate and require improvements to accomplish the reduction of pollution required for protection of the receiving waters.

(4) Gradual progress in abatement of pollution is indicated by the construction of six new municipal waste treatment plants during the past six-year period (1947-1952). More significant progress has been made in the disposal of oil field wastes although the record of activities is not complete for enumeration.

(5) Greater efficiency can be attained from existing waste treatment plants, and facilities constructed in the future, by expanding the program activities of the responsible water pollution control agencies in the States to provide for more complete surveillance of plant operation and to train plant operators.

(6) The benefits resulting from a program of pollution control will affect all beneficial water uses. Construction of needed waste treatment facilities will permit full utilization of the available water resources for present needs and for future requirements of anticipated increase in population, and expanded industrial and agricultural activities.

(7) The deficiencies of information and gaps in data indicated throughout the report, particularly regarding sources of industrial pollution, are as significant as the presentation of available facts and statistics. They indicate the work which still needs to be done by water pollution control authorities to define completely the scope of the problems.

(8) In both Arkansas and Louisiana, existing State anti-pollution legislation is regarded as adequate for the water pollution control agencies to sponsor and enforce effective programs of pollution abatement.

(9) A preliminary estimate, based on data available, indicates that the initial cost for providing needed municipal waste treatment facilities in the basin will be approximately $4,500,000. It is reasonable to assume that re-evaluation of needs, when more complete data become available, may change the estimate appreciably. The estimate does not include consideration of cost for providing needed industrial waste disposal facilities.

RECOMMENDATIONS

It is recommended that:

(1) Continued and accelerated efforts be made by the responsible water pollution control agencies of the States to secure supplemental data, particularly on industrial waste pollution, for the purpose of defining the problems more completely and to permit evaluation of needs for instituting reasonable corrective measures.

(2) Municipalities and industries assume their responsibility for preventing and abating pollution in the waters of the basin and initiate construction of needed projects as outlined herein.

(3) Louisiana initiate a review of the present municipal tax structures as related to financing of waste treatment and related public works in the State. The examination should accomplish an evaluation of the existing financing methods for the purpose of enacting supplemental legislation to assist the municipalities in financing needed facilities.

(4) The State Legislature of Arkansas appropriate sufficient funds, commensurate with the delegated responsibilities of the Water Pollution Control Commission, for acquiring necessary personnel and equipment to carry on needed program activities.

(5) In order to derive full benefit from existing pollution abatement facilities, expanded program activities of the responsible agencies should provide for more complete surveillance over operation of waste treatment plants, and through training courses, make available trained and competent plant operators.

(6) Public educational programs sponsored by the responsible State agencies be intensified as a means of publicizing the extent of pollution in the basin and informing the public of the damages resulting from pollution and benefits to be derived from pollution abatement.

(7) The States of Arkansas and Louisiana, through formal interstate agreement or otherwise, initiate concerted programs of pollution abatement on the Ouachita River with the objective of restoring the quality of river water to that suitable for public water supply sources.

PHYSICAL DESCRIPTION

The Ouachita River, one of the principal tributaries of the Red River, arises in the Ouachita Mountains in west-central Arkansas above Mena, Arkansas, and flows in a general easterly direction to Hot Springs, Arkansas, where it turns south and flows through Arkansas and Louisiana. The Ouachita joins the Tensas River near Jonesville, Louisiana, and becomes the Black River. The Black River joins the Red River about 35 miles above the confluence of the Red and the Mississippi Rivers.

The Ouachita drainage basin is about 300 miles long and about 150 miles wide at its widest point. It embraces about 22,400 square miles of which 13,200 square miles are in Arkansas and the remainder in Louisiana. About 3,500 square miles of the drainage area are in the Ouachita Mountains. Principal tributaries are: Caddo River, Little Missouri River, Smackover Creek, Moro Creek, and Saline River in Arkansas; Bayou Bartholomew, Corney Creek, Bayou La Fourche, and Tensas River in Louisiana.

In the headwaters area, the Ouachita Mountains consist of a series of narrow valleys and long ridges with elevations varying from 500 to 2000 feet above sea level. The upper 158 miles of the Ouachita River drains these mountains by means of numerous short tributaries with a trellis-like pattern. Stream slopes are steep, averaging 12 feet per mile, in this area. After leaving the mountains the stream enters the gentle sloping coastal plains which have an average altitude of about 250 feet. Stream slopes average about 3 feet per mile in this area. In Louisiana, the stream flows through the alluvial deposits of the Mississippi River valley at an elevation of about 100 to 150 feet.

The average annual temperature in the basin is about 65°F, ranging from 43°F in January to 83°F in July. The average annual precipitation is about 50 inches, being heaviest in the winter months.

Runoff in the mountainous section is heavy and results in frequent floods. During dry weather, stream flows dwindle to small proportions. These conditions result in extreme variations in stream flows. Average, maximum, and minimum flows at gaging stations in the basin are tabulated below:

Gaging Station	Drainage Area (square miles)	Years of Record	Stream Flows (c.f.s.) Average	Maximum	Minimum
Ouachita River Mountain Pine, Ark.	1,100	11	1,797	123,000	11
Ouachita River Malvern, Ark.	1,570	20	2,368	140,000	40
Ouachita River Monroe, La.	15,400	54	-	100,000	12
Little Missouri River Murfreesboro, Ark.	380	13	627	120,000	3
Saline River Rye, Ark.	2,040	10	2,660	47,600	8
Bayou La Fourche Crew Lake, La.	-	9	-	16,900	1
Tensas River Tendal, La.	-	9	-	3,050	4

ECONOMIC DEVELOPMENT

The 1950 population in the basin area was approximately 741,500. The principal population, manufacturing and commercial centers are: Hot Springs - 29,307, El Dorado - 23,076, Camden - 11,372, Malvern - 8,072, Arkadelphia - 6,819, Benton - 6,277, and Monticello - 4,498 in Arkansas; and Monroe - 38,572, West Monroe - 10,302, Bastrop - 12,769, Ruston - 10,372, Tallulah - 7,758, and Homer - 4,749 in Louisiana.

Outside the rich alluvial bottom lands, soils of the area are generally thin and poor. The principal agricultural crop is cotton. Overgrazing and cultivation of hillside lands have resulted in extensive erosion and soil deterioration.

Large bauxite deposits are mined in Pulaski and Saline Counties, Arkansas, for aluminum production and for utilization in the production of abrasives and chemicals. Petroleum is produced in the oil fields in southwestern Arkansas and northern Louisiana. Manufacturing developments are those associated with processing of lumber, bauxite ores, petroleum, and cotton. About 1500 tons of paper are manufactured daily by four mills in the basin. A large acreage of forest land, much of which lies within the basin, supplies pulpwood for the manufacture of paper. Wastes from lumber production are also utilized for the manufacture of paper.

USES OF WATER RESOURCES

Water uses in the Ouachita River Basin reflect, in large part, the general character and economic activities of the region. Surface water supplies of good quality and in large quantity are obtained from the Ouachita and tributary streams in the Ouachita mountain region. In the Gulf Coastal Plain area ground water of suitable quality and quantity for irrigation and other agricultural uses is available, though in some local areas overpumping has reduced water levels to the point where wells have had to be abandoned. The quality of the ground water varies in the Gulf Coastal Plain and in some places the quality is not desirable for industrial or municipal use.

The principal water uses considered pertinent to the problem of water pollution control in the basin include: municipal and industrial water supplies; agriculture, including irrigation and livestock watering; recreation; fish and wildlife propagation; hydroelectric power production; and disposal of treated and untreated municipal and industrial wastes. Map No. 1 shows the existing primary water uses in the basin.

Municipal and Industrial Water Supplies

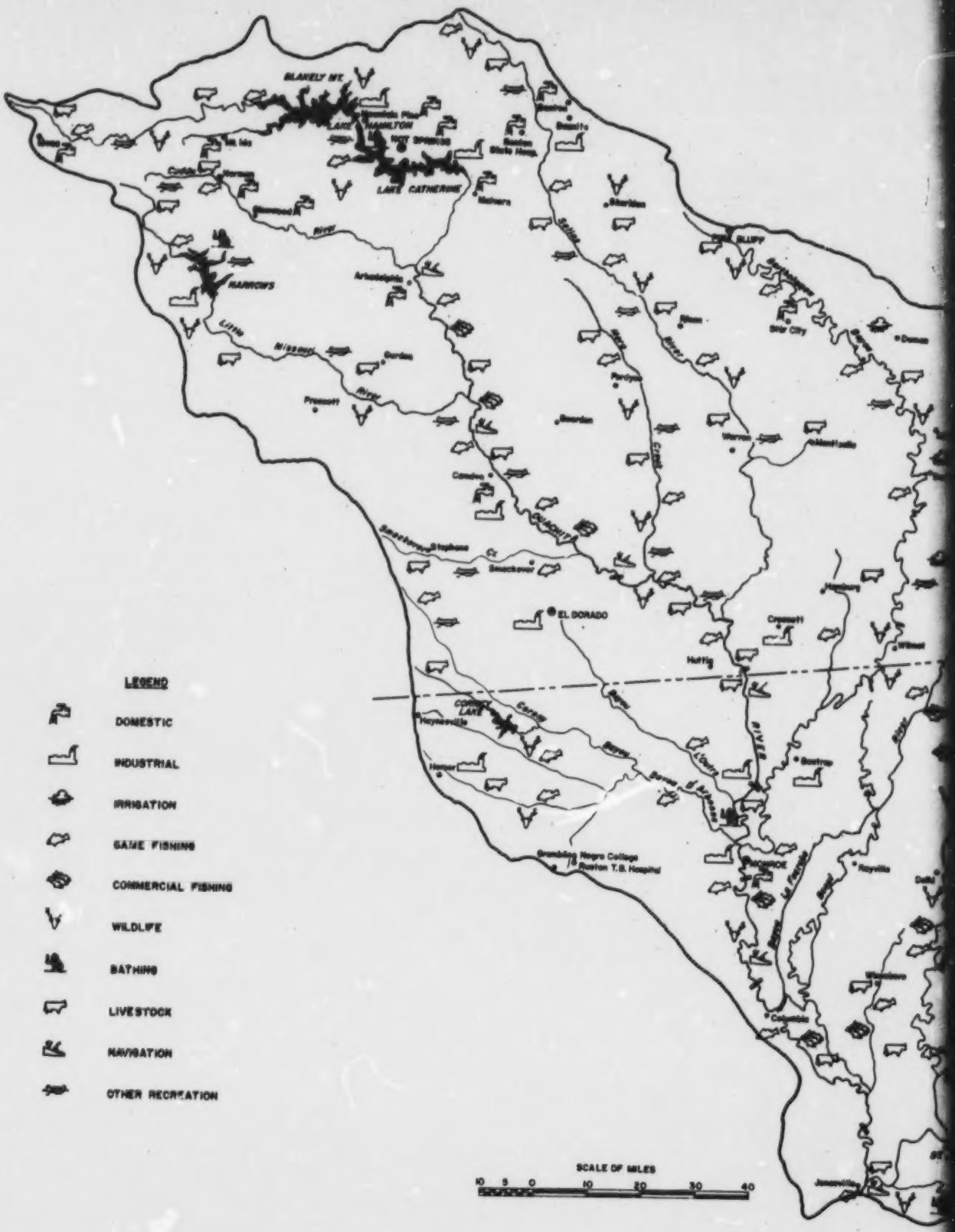
Table 1 shows a summary of municipal water supplies in the basin. There are 89 municipal water supplies in the basin serving 442,315 persons with an average of 38.8 million gallons daily. Eleven municipalities in Arkansas and one municipality in Louisiana use surface waters as sources of supply to serve 267,250 persons with an average of 23.4 million gallons daily. Little Rock, Arkansas, although located outside the Ouachita Basin, obtains its water supply from Lake Winona, an impoundment on the Saline River which is a tributary of the Ouachita and serves 155,000 persons in the metropolitan area with an average of 13 million gallons per day. Seventy-seven municipalities use underground sources of water to serve 175,065 persons with an average of 15.4 million gallons daily.

Table 2 shows industrial water uses in the basin. In addition to the groups of industries shown, there are numerous individual industries which obtain water from municipal supplies. The water consumption by these industries is reflected in Table 1 showing data on municipal water supplies.

A large amount of surface water of excellent quality is available from streams in the Ouachita mountain area of Arkansas. Ground water in limited quantity is also available for municipal and industrial supplies in the Ouachita Mountains, but is quite highly mineralized. The Gulf Coastal Plain region yields large quantities of ground water of variable quality. Throughout most of the region the ground water is of excellent quality, although in some areas the water is not desirable for municipal and industrial uses.

Agricultural Use

Cotton, rice, livestock, and lumber are important agricultural products of the basin. Rice growing is practiced extensively in the


BLAKELY MT.
LAKE HAMILTON
LAKE CATHERINE
NARROWS
EL DORADO
LEGEND
DOMESTIC
INDUSTRIAL
IRRIGATION
GAME FISHING
COMMERCIAL FISHING
WILDLIFE
BATHING
LIVESTOCK
NAVIGATION
OTHER RECREATION
SCALE OF MILES
10 5 0 10 20 30 40

OUACHITA RIVER BASIN

EXISTING PRIMARY WATER USES

FEDERAL SECURITY AGENCY
Public Health Service
Division of Water Pollution Control
MAP NO. 1

TABLE 1 - OUACHITA RIVER BASIN

MUNICIPAL WATER SUPPLIES

Municipality	Population Served (1949)	Average Pumpage M.G.D.	Average Consumption gals./cap./day	Remarks
		From Surface Water Sources		
ARKANSAS				
Arkadelphia	7,000	0.45	60	Ouachita River.
Bauxite	2,950	0.25	80	Saline River.
Benton	5,400	0.509	90	Saline River.
Benton State Hosp.	2,500	0.30	120	Saline River.
Camden	9,000	0.95	110	Ouachita River.
Glenwood	1,000	0.05	50	Caddo River.
Hot Springs	42,000	3.80	90	Impoundment.
Little Rock*	155,000	13.00	80	Saline River (Lake Winona).
Malvern	5,500	0.50	90	Ouachita River.
Mount Ida	700	0.03	40	Impoundment.
Mountain Pine	1,200	0.06	50	Impoundment (Glazypeau Creek)
		From Ground Water Sources		
Arkansas City	1,000	0.036	40	
Bearden	1,100	0.045	40	
Crossett	6,000	2.0	300	Consumption includes large industria[illegible]
Cullendale	1,000	0.05	50	
Dermott	3,000	0.20	60	
Dumas	2,200	0.14	60	
El Dorado	20,000	2.00	200	
Eudora	1,700	0.10	60	
Fordyce	4,000	0.20	50	
Gurdon	2,000	0.125	60	
Hamburg	1,900	0.10	50	

*Little Rock is located outside Ouachita Basin.

TABLE 1 - OUACHITA RIVER BASIN (cont'd)

MUNICIPAL WATER SUPPLIES

Municipality	Population Served (1949)	Average Pumpage M.G.D.	Average Consumption gals./cap./day	Remarks
Hampton	850	0.04	50	
Hope	10,400	0.60	60	
Huttig	2,000	0.11	50	
Junction City	1,500	0.07	50	
Lake Katherine State Park	-	-	-	
Lake Village	1,450	0.09	60	
Lonsdale	80	0.003	75	
Louann	1,500	0.06	40	
McGehee	5,100	0.28	50	
Monticello	5,000	0.25	50	
Monticello A.& M.	-	-	-	
Norman	250	0.02	80	
Murfreesboro	1,600	0.06	40	
Norphlet	700	0.03	40	
Parkdale	360	0.025	70	
Portland	450	0.016	35	
Prescott	4,000	0.40	100	
Rison	1,000	0.055	55	
Rosston	-	-	-	
Sheridan	1,300	0.125	100	
Smackover	4,000	0.25	60	
Sparkman	1,000	0.05	50	
Star City	1,500	0.10	70	
Stephens	1,100	0.10	90	
Strong	-	-	-	
Tillar	300	0.03	100	

TABLE 1 - OUACHITA RIVER BASIN (cont'd)

MUNICIPAL WATER SUPPLIES

Municipality	Population Served (1949)	Average Pumpage M.G.D.	Average Consumption gals./cap./day	Remarks
Warren	4,500	0.30	70	
Wilmar	500	0.025	50	
Wilmot	800	0.036	50	
Winchester	135	0.008	60	
		From Surface Water Sources		
LOUISIANA				
Monroe	35,000	3.50	100	
		From Ground Water Sources		
Bastrop	7,500	0.45	60	
Bernice	750	0.06	80	
Bonita	400	0.05	125	
Columbia	1,500	0.09	60	
Collinston	400	0.06	150	
Delhi	3,000	0.15	50	
Dubach	800	0.025	30	
Farmerville	1,500	0.20	130	
Ferriday	3,200	0.30	90	
Gilbert	400	0.05	125	
Grayson	475	0.015	30	
Harrisonburg	500	0.05	100	High in chloride, 655 p.p.m. maxim.
Haynesville	4,000	0.275	70	
Holly Ridge	700	0.25	360	
Homer	3,400	0.60	175	
Junction City	400	0.04	100	

TABLE 1 - OUACHITA RIVER BASIN (cont'd)

MUNICIPAL WATER SUPPLIES

Municipality	Population Served (1949)	Average Pumpage M.G.D.	Average Consumption gals./cap./day	Remarks
Lake Providence	4,000	0.30	75	
Rayville	3,500	0.20	60	
Ruston	10,000	1.25	125	
St. Joseph	800	0.05	60	
Tallulah	5,000	0.21	40	
Waterproof	200	-	-	
Winnsboro	2,800	0.3	110	
Wisner	1,200	0.05	40	
Baptist Children's Home (Monroe)	150	0.002	13	
Ouachita T. B. San. (Monroe)	100	-	-	
Grambling Negro College (Ruston)	1,600	-	-	
La. Polytechnic Inst. (Ruston)	3,700	-	-	
T. B. Hospital (Ruston)	1,490	0.112	100	
Mangham	1,000	0.05	50	
MerRouge	725	0.06	80	
West Monroe	12,000	1.75	150	
Newellton	900	0.08	90	
Oak Grove	1,400	0.15	110	
Oak Ridge	300	0.05	170	

TABLE 2

INDUSTRIAL WATER USE DATA
FOR REPRESENTATIVE GROUPS OF INDUSTRIES

OUACHITA RIVER BASIN

Type of Industry (Number of Plants)	Surface Water Supplies		Ground Water Supplies		Uses
	Total Use (g.p.d.)	Consumption (g.p.d.)	Total Use (g.p.d.)	Consumption (g.p.d.)	
ARKANSAS					
Chemicals (1)	-	-	7,900,000	-	Process
Pulp and Paper (2)	7,000,000	0	15,000,000	0	Process
Primary Metals (2)	Undet.	-	-	-	Process & Cooling
Food & Kindred Products (2)	-	-	20,000*	0	Cooling & Washing
Textile (1)	-	-	25,400*	0	Process & Domestic
Lumber & Wood Products (5)	888,000	0	3,000,000	0	Process, Domestic, Boiler Feed, Cooling
Petroleum Products (1)	-	-	270,000	0	Process & Cooling
LOUISIANA					
Petroleum Products (6)	-	-	1,275,000	630,000	Cooling & Boiler Feed
Chemicals (2)	56,000,000	1,500,000	-	-	Process
Pulp & Paper (3)	15,000,000	0	34,500,000	1,000,000	Process
Power Plant (1)	300,000,000	0	-	-	Cooling

* From public supply and company-owned wells.

eastern portion of the basin and large amounts of water for irrigation are obtained from Bayou Bartholomew and underground sources. During the last two growing seasons sizeable acreages of rice have been planted along the Ouachita River near Arkadelphia. Considerable quantities of water are pumped from the Ouachita River for irrigation of these plantings. Surface waters of good quality are available generally in the basin for the raising of livestock.

Hydroelectric Power Use

Three dams on the Ouachita River are used for the production of hydroelectric power. They include Remmel, Carpenter, and Blakely Mountain Dams, all located on the upper Ouachita River. In addition, hydroelectric power is generated at Narrows Dam on the Little Missouri River.

Recreation

The use of surface waters for recreational activities is of considerable importance in the basin. It is estimated that three million dollars are spent annually at Lake Catherine and Lake Hamilton by visitors and vacationers. The Oxbow Lakes in Arkansas and Louisiana afford various forms of recreation including fishing, bathing, and boating to large numbers of residents in the area. Fishing is practiced generally along the main stem of the Ouachita and also along most of the tributaries and provides recreation to many local residents.

At the Hot Springs National Park in Arkansas extensive use is made of the mineralized hot springs water for its therapeutic value. Twenty-four bathhouses under control of the U. S. Government are operated to provide hot baths and massage treatments to the public. These baths and other recreational facilities in the area attract an estimated 100,000 persons annually to Hot Springs.

Fish and Wildlife

Use is made of the waters for both sport and commercial fishing. Tables 3 and 4 show the number of fishing, hunting, and trapping licenses sold in the Ouachita Basin portion of the two States of the basin. Severance tax records of Louisiana show that over 1-1/2 million pounds of fish were sold during the 1948-49 season. Nearly 700 licenses were issued to commercial fishermen in the entire State of Louisiana.

Forests and other cover in the Ouachita Basin are suitable for the propagation of deer, wild turkeys, quail, dove, squirrel, raccoon, and other wildlife. In addition, waterfowl and such animals as muskrat and mink, which are plentiful, require an aquatic environment. Tables 5 and 6 show the game refuges in the area.

Navigation

The Ouachita River and nine tributaries provide about 1500 miles of navigable waterways. Locks and dams are maintained on the Ouachita to provide minimum depth channels for a distance of 217 miles from Arkadelphia, Arkansas, to the Black River. These navigable waters provide low cost

TABLE 3 - FISHING LICENSES SOLD
IN ARKANSAS

No. of Counties	Resident	Non-Resident	Trip	Total
24	70,173	1,031	10,351	81,555
	(5 counties are partially in basin)			

TABLE 4 - FISHING AND HUNTING LICENSES SOLD
IN LOUISIANA

	Fishing 1949			Hunting 1949-1950		Trapping
No. of Parishes	Resident	Non-Resident	7-Day Trip	Resident	Non-Resident	1949-1950
11	9,185	525	266	37,774	19	968

TABLE 5 - GAME REFUGES IN OUACHITA BASIN - (ARKANSAS)

Name and Location	Acreage
Region No. 2 - Ouachita Mountain Region	
Montgomery, Scott, & Yell Counties, Ouachita Mt. Game Preserve	78,000
Polk-Caney Creek Fed. Game Refuge	8,300
Region No. 3 - Coastal Plains Region	
Ashley County Game Refuge	29,000
Bradley-Cleveland County Game Refuge	13,500
Calhoun County Game Refuge	16,500
Clark County Game Refuge	36,600
Columbia-Union County Game Refuge	15,360
Dallas County Game Refuge	21,000
Grant County Game Refuge	20,480
Grant-Saline County Game Refuge	21,750
Hot Spring County Game Refuge	15,600
Ouachita County Game Refuge	13,760
Pike County Game Refuge	22,000
Region No. 4 - Delta Region	
Arkansas-Monroe-Phillips-White River Nat. Wildlife Refuge	117,000
Jefferson County Game Refuge	19,500
Lincoln County Game Refuge	15,000
Total Acreage	462,750

TABLE 6 - GAME REFUGES IN OUACHITA BASIN - (LOUISIANA)

Name and Location	Acreage
Caldwell Parish Refuge	12,000
Union Parish Refuge	10,000
Chicago Mill & Lubmer Co. (Formerly Singer Game Preserve) (Madison Parish)	35,000
Theodore Terzia Game Preserve (Morehouse Parish)	58,000
Fisher-Ayers Wildlife Refuge (Tensas & Madison Parishes)	22,000
Total Acreage	137,000

transportation for agricultural products and a variety of raw and finished industrial products.

Waste Disposal

It is recognized that some portion of the waters in the streams of the basin must be used for the final disposal of municipal and industrial wastes. The Ouachita River and several of the tributary streams are utilized for the disposal of raw and treated wastes from municipalities and industries. The use of the watercourses for this purpose, however, is too often exploited and continues uncontrolled at the expense of the primary water uses.

Water Quality

The quality of water in the Ouachita River, and in general in the tributaries above Camden, Arkansas, is excellent though there is a slight increase in mineral concentration from Mt. Ida downstream to Camden. Between Camden and Calion, Arkansas, there is a large increase in mineral content and according to U. S. Geological Survey records the dissolved solids range from 193 p.p.m. at Camden to as much as 1220 p.p.m. at Calion, Arkansas. Much of this increase is attributed to chlorides from Smackover Creek. Although analytical data are not available to show conditions during low flow periods, it is expected that mineral concentration increases at Felsenthal due primarily to additional inflow from Lapile Creek which carries a high chloride content.

The principal tributaries entering the Ouachita in Arkansas from the western side are the Caddo River above Arkadelphia, the Little Missouri between Arkadelphia and Camden, Smackover Creek upstream from Calion, and Lapile Creek upstream from Felsenthal. The Caddo and Little Missouri Rivers are low in hardness and dissolved solids. Smackover Creek is a highly mineralized stream, carrying water with as high as 2880 p.p.m. dissolved solids, which is principally chloride. During certain periods, Lapile Creek is extremely high in mineral content.

Data on water quality are available for two tributaries, the Saline River and Moro Creek, on the eastern side of the Ouachita in Arkansas. Water in the headwaters of tributaries to the Saline River is of excellent quality. The impoundment at Lake Winona provides water for the City of Little Rock, Arkansas. Drainage from bauxite mines near Bentow discharges to Hurricane Creek, a tributary of the Saline River. The sulfate content is high in Hurricane Creek and causes the sulfate concentration to remain high in the Saline River as far downstream as Rye, Arkansas. Moro Creek discharges into the Ouachita River a few miles downstream from Calion. Dissolved solids in this tributary are low, but the water is characterized by high color from swamp drainage.

Several tributary streams originating in southwestern Arkansas flow into Louisiana where they discharge to the Ouachita River. The principal streams are Cornie Creek, Three Creeks, Bayou De Loutre, Dorcheat Creek, and Bodcau Bayou. These streams receive drainage from oil fields and

carry appreciable amounts of chloride. Concentrations of chloride have amounted to more than 6000 p.p.m. in Cornie Creek and Three Creeks, and smaller amounts of chloride are found in Bayou De Loutre. Dorcheat Creek and Bodcau Bayou contain insignificant amounts of chloride.

Bayou Macon, Bayou Bartholomew and Boeuf River originate in southeastern Arkansas. These streams carry water of generally good quality and are utilized for a variety of water uses. Rivers and Bayous originating in Louisiana east of the Ouachita River form a network of streams which eventually discharge to the Ouachita River. The water in these streams is generally of good quality and is used for a number of purposes. A limited number of analyses for some of these waters shows that total hardness is quite variable. The majority of analyses show that the hardness of the water is less than 50 p.p.m., but some analyses show that the hardness reaches 200 p.p.m. in Cornie Creek, Boeuf River, and Bayou Macon. One sample from the Tensas River at Tendal, Louisiana, shows a hardness of nearly 200 p.p.m.

POLLUTION CONTRIBUTED TO WATER RESOURCES

The principal sources of pollution discharging to the waters of the Ouachita River Basin are municipalities and industries. Pollution from natural sources is a minor problem in the basin. Pollution from municipal sources consists of sewage and other wastes discharged without treatment in some cases and with various degrees of treatment in other instances. Pollution from industrial sources consists of wastes from production and process operations. Industries considered in this report include those which discharge directly to watercourses through separate outlets. Natural pollution results from deleterious materials such as silt and dissolved minerals that are carried in the waters.

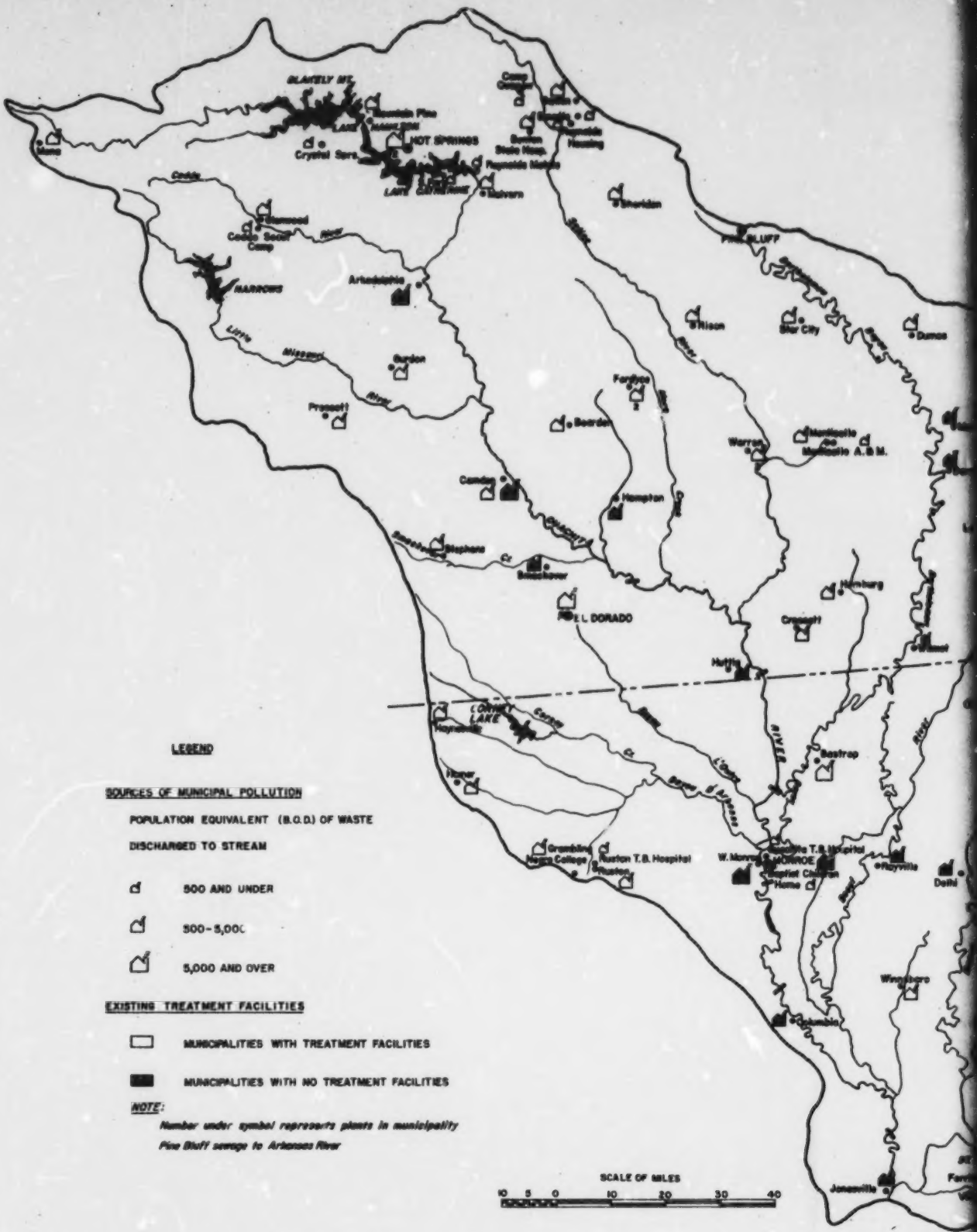
Data on municipal and industrial sources of pollution in the Ouachita River Basin are summarized in Tables A and B respectively. A detailed summary of basic data on municipal sources of pollution is shown in Table 1a in the appendix. Maps No. 2 and 3 show the locations of municipal and industrial sources of pollution and the status of existing waste treatment facilities.

Natural pollution is a minor problem in the basin. The U. S. Geological Survey sampling records show that at various stations in the upper Ouachita and Saline Rivers chlorides, dissolved solids, and hardness were present in small amounts. Progressive downstream increases in mineral content are attributed to industrial wastes in the middle Ouachita and the Saline River drainage areas.

There are 59 municipalities within the basin with sewerage systems serving a total connected population of 221,600. Hampton, Arkansas, is presently undertaking construction of a collection system and treatment plant.

The pollution load discharged to the waters of the basin from the 59 municipal sources is estimated to be equivalent to the untreated wastes produced by a population of 148,000 persons (population equivalent). This pollution load originates from a combined sewered population of 221,600 and from several industrial plants discharging wastes to the municipal sewerage systems. The reduction, by treatment, of the original pollution load from the 59 municipal sources amounts to about 33 percent.

The cities of Arkadelphia, Dermott, McGehee, Huttig, Wilmot, and Smackover, all in Arkansas, discharge raw sewage into the Ouachita River or its tributaries. Of these cities, Arkadelphia and McGehee are actively planning for sewage treatment facilities. Hampton, Arkansas, which is also classified as discharging untreated wastes, is constructing treatment facilities at the present time. The cities of Columbia, Delhi, Monroe, West Monroe, Rayville, and Tallulah, all in Louisiana, discharge raw sewage into the Ouachita River or its tributaries. Jonesville, Louisiana, discharges raw sewage into the Black River. The cities of Lake Providence and Vidalia, both in Louisiana, discharge raw sewage into the Mississippi River.


BLANTLY MT.
LAKE
HOT SPRINGS
Crystal Springs
Lake Catherine
Malvern
Camp
Creek
Hammond
Caddo Scout Camp
HARROWS
Arkadelphia
Little
Missouri
River
Prescott
Gurdon
Fordyce
Bearden
Camden
Hampton
Stephens
Smackover
EL DORADO
Warren
Hamburg
Crossett
Hutting
Lonoke
LAKE
Keo
Lonoke
Carlisle
Bayou
DeView
Arkansas
RIVER
Bayou
Bartholomew
Bastrop
Grambling
Negro College
Ruston T.B. Hospital
Ruston
W. Monroe
MONROE
Hospital
Children
Home
Rayville
Delhi
Winnsboro
Columbia
Jonesville
Black
River
Ouachita
River
Bayou
Bartholomew
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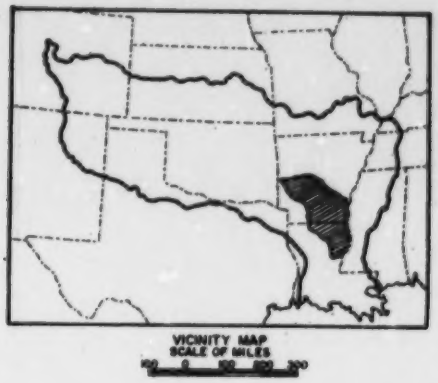
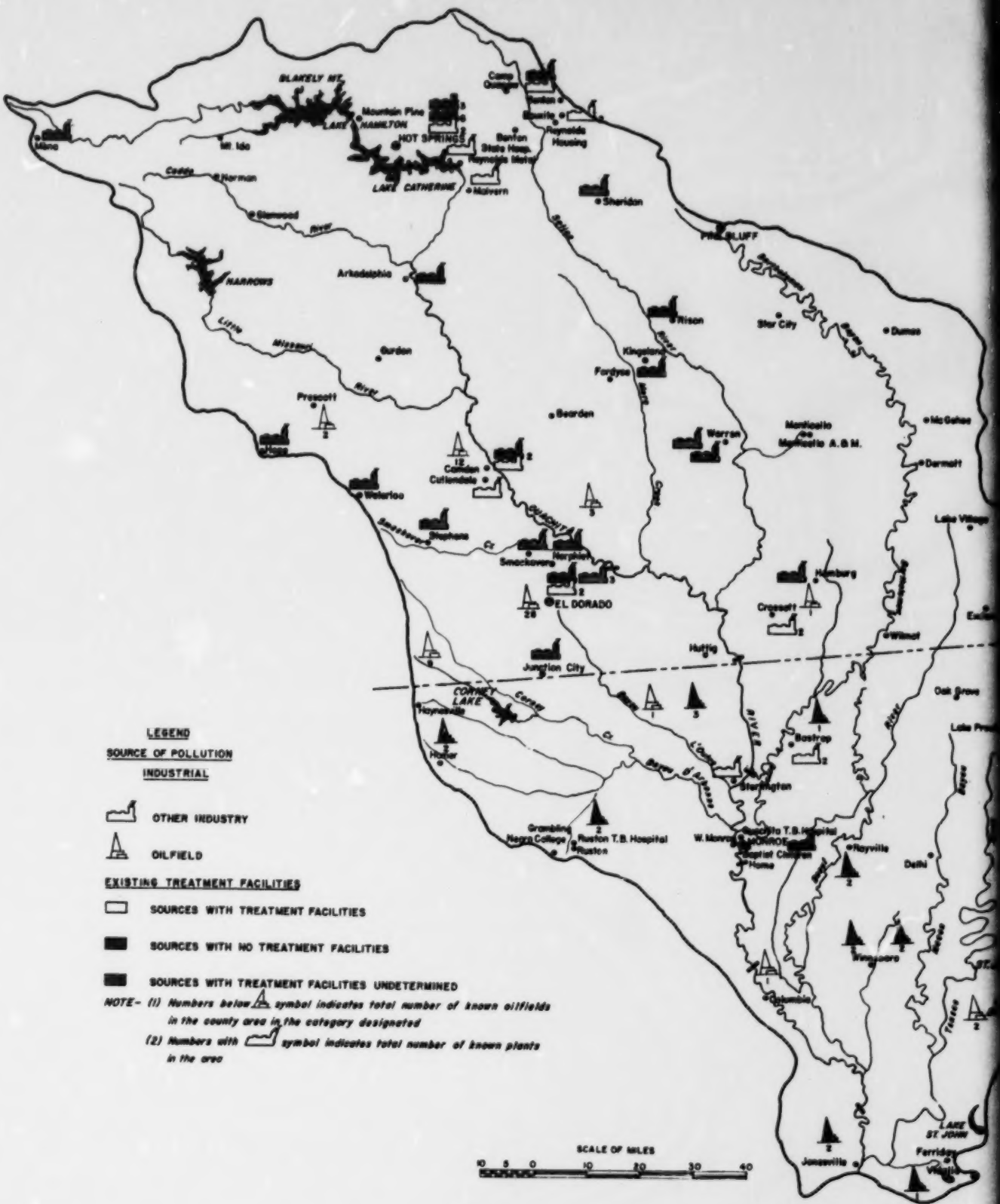


OUACHITA RIVER BASIN

SOURCES OF MUNICIPAL POLLUTION AND EXISTING TREATMENT FACILITIES

FEDERAL SECURITY AGENCY
Public Health Service
Division of Water Pollution Control
MAP NO. 2



LEGEND

SOURCE OF POLLUTION

INDUSTRIAL

OTHER INDUSTRY

OILFIELD

EXISTING TREATMENT FACILITIES

SOURCES WITH TREATMENT FACILITIES

SOURCES WITH NO TREATMENT FACILITIES

SOURCES WITH TREATMENT FACILITIES UNDETERMINED

NOTE- (1) Numbers below △ symbol indicates total number of known oilfields in the county area in the category designated

(2) Numbers with ▭ symbol indicates total number of known plants in the area

OUACHITA RIVER BASIN

SOURCES OF INDUSTRIAL POLLUTION AND EXISTING TREATMENT FACILITIES

FEDERAL SECURITY AGENCY
Public Health Service
Division of Water Pollution Control
MAP NO. 3

Many of the existing treatment facilities in the basin are inadequate from the standpoint of capacity and operation, and, therefore, contribute considerable pollution to the watercourses. For many of these towns treatment facilities are not now required by the Louisiana State Health Department since present conditions indicate that the receiving streams are capable of absorbing the pollution load. Data for these individual towns are contained in Table 1a. The number of industries having separate outlets discharging to the waters of the basin are shown in Table B. There are 124 industries listed in this category. The general types of industries include food processing plants, pulp and paper mills, primary metal industries, chemical plants, oil fields, and petroleum processing industries. Data necessary to estimate the amount of pollution reaching the watercourses are available for only a portion of the industries. It is known that 36 industries produce organic wastes; 79 industries produce inorganic wastes; 7 industries produce both organic and inorganic wastes typical of chemical plants and oil refineries; and two industries produce wastes of an undetermined type.

A considerable amount of the industrial wastes originate from the production and processing of petroleum. An undetermined amount of oil field wastes reaches the streams of the basin from oil fields in Union, Calhoun, Columbia, Ouachita, and Nevada Counties in Arkansas and from Claiborne, Concordia, Franklin, Lincoln, Tensas, Richland, and Union Parishes in northern Louisiana. Numerous tributaries of the Ouachita River include Bayou De Loutre, Bayou Lapile, Smackover Creek, and Corney Creek which are polluted by oil field wastes. Pulp and paper mill wastes in varying quantities are discharged into the main stem of the Ouachita near Camden and Crossett, Arkansas, and Monroe, Louisiana. Similar wastes are also discharged into the Little Bayou Boeuf in Louisiana.

Wastes from mining operations at Bauxite, Magnet Cove, and Malvern reach the headwater tributaries of the Ouachita River.

Additional investigations and studies of municipal and industrial wastes are needed to determine the characteristics and volumes of wastes. Such information is necessary to estimate the pollution load imposed on the receiving waters and also to evaluate the corrective measures required to protect the waters for downstream uses.

TABLE A

SOURCES OF POLLUTION

MUNICIPAL

Municipalities*	Sources of Pollution (In Number of Municipalities*)	Population Served by Sewerage System	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent Number of People)
Having data on pollution load discharged to watercourse	Ark. 39 La. 20	Ark. 138,400 La. 83,200	Ark. 83,700 La. 64,300
Having population data available (Data on pollution load to watercourse incomplete or not available)	-	-	-
TOTAL	59	221,600	148,000

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers or other population centers; sanitary sewage wastes discharged by industry directly into watercourse and industrial wastes discharged into municipal sewage systems.

TABLE B

SOURCES OF POLLUTION

INDUSTRIAL

Industries	Sources of Pollution (In Number of Plants)	Amount of Pollution Discharged to Watercourse (In Terms of Equivalent Number of People)
Producing Organic Wastes	Ark. 10 La. 1	Ark. 2,100 La. 49,000
Producing Organic Wastes	Ark. 29* La. 3	Undetermined
Producing Inorganic Wastes	Ark. 64 La. 22	-
Producing Wastes of Undetermined Type	Ark. 2 La. 0	Undetermined
TOTAL	124**	-

*Includes seven plants also producing inorganic wastes.
**Total adjusted to correct for duplication noted in footnote marked thus *.

DAMAGES TO WATER RESOURCES FROM POLLUTION

Damages to water resources from pollution in the Ouachita River Basin may be considered under two general categories, namely, the existing or specific damages and the potential damages, which may result from the use of polluted waters. Practically all primary water uses in the basin are affected to some degree by pollution originating from municipal, industrial, or natural sources. Minor damages to the water resources in the upper reaches of the Ouachita River have resulted whereas damages to the lower portions of the river have been quite extensive.

There are 11 municipalities in Arkansas and one municipality in Louisiana which obtains surface water supplies from the Ouachita River or its tributaries. In each case some type of treatment is required for domestic use. The facilities are not considered adequate in all cases to cope with the quality of the raw water available. High concentrations of bacteria, taste and odor-producing substances, and other deleterious materials which are present in waters used for sources of public supply, increase the cost of treatment and are an ever present hazard which challenge the delivery of a safe and palatable water for public consumption. Other types of pollution in the form of silt and high mineral content similarly increase the cost of treatment by requiring more chemicals, additional physical facilities, and extra operating personnel.

Because of the high chloride content, the City of Monroe, Louisiana, has abandoned the Ouachita River as a source of public water supply and has developed an impoundment on Bayou De Siard.

Several industries in the Arkadelphia-Camden area have developed well supplies for domestic use because of the sewage and industrial waste pollution in the available river waters.

Damages to electric power generating plant operations result from the growth of slime in the condenser water systems. Inadequately treated sewage discharged into Lake Hamilton and Lake Catherine from the Hot Springs plants necessitates treatment of the water needed for this industrial use. In other areas, particularly in Louisiana, excessive mineralization, primarily chloride, has discouraged the establishment of industry.

Inadequately treated sewage discharged into Lake Hamilton and Lake Catherine has rendered some sections of the lakes unfit for bathing and less desirable for other recreational uses.

Sport fishing has been virtually destroyed in streams in Union and Ouachita County areas by the discharge of oil field wastes to the watercourses. In other areas of southern Arkansas and northern Louisiana, sport fishing has been damaged by the discharge of brines, oils, and other pollutants from the fields in those areas. Brines and

oils find their way directly to watercourses from many wells that provide no disposal for these wastes. In other instances pits that have been constructed for waste disposal are not adequate in capacity or are not properly operated to provide protection to the watercourses. Wide areas of natural drainage watercourses have been rendered barren of trees and other vegetation due to the oil and brine deposits on the land. In the vicinity of Cullendale and Crossett, Arkansas, and Bastrop and Monroe, Louisiana, sport and commercial fishing has been damaged from the combined effects of the sewage, paper and pulp mill, and chemical plant wastes. Grazing lands and stock watering streams have been damaged from oil field wastes in several areas in both Arkansas and Louisiana.

Some of the tributaries to the Ouachita River which have been damaged by brine wastes include Smackover, Lapile, De Loutre, Cornie, and Three Creeks. The two latter streams receive pollution from Village Field in Arkansas. Plans are currently being made to accomplish complete reinjection of the brines produced at this field.

Silt pollution is a problem in the lower portion of the Ouachita River and affects the navigation facilities. Dredging and snag removal is a considerable portion of the annual expense for the maintenance of the locks and dams.

Wastes from mining operations in the Benton-Bauxite-Malvern area contribute considerable amounts of acids and sulfates to the streams and affect fish resources and other water uses.

BENEFITS RESULTING FROM POLLUTION PREVENTION AND ABATEMENT

In a consideration of benefits resulting from pollution prevention and abatement, it can be stated generally that all legitimate water uses derive some degree of benefit, either directly or indirectly, from a program of pollution control. In some cases the benefits can be evaluated on a monetary basis and are regarded as tangible benefits. Most generally prevailing, however, are the intangible benefits to public health, recreation, aquatic life, and purely aesthetic considerations, which are equally real and justified, but because of their nature cannot readily be assigned a specific or monetary value.

Those communities in the basin using ground waters for public supplies will be confronted with critical water shortages if there is a depletion of the ground water supplies resulting from increased demand for population growth and industrial development. Protecting the available surface waters from pollution will make them available for new sources of supply and permit optimum use for the existing supplies. Abatement and reduction of pollution will alleviate the need for developing new sources and in some cases will eliminate large capital expenditures for such purposes. Pollution abatement will also permit municipal water treatment plants now treating polluted water to operate at less cost and with a greater factor of safety from a public health standpoint.

Industrial plants now dependent on damaged water resources for drinking water and process waters will benefit from reduced cost of water treatment. Pollution abatement and prevention will permit use of accessible waters at desirable industrial sites and will be an inducement for industrial expansion and development. The industrial development and expansion will bring direct financial benefits in increased income and economic stability for the Ouachita River Basin.

In the El Dorado area ground water supplies are used exclusively for municipal and industrial water supplies. There are strong indications, based upon the fact that the ground water table has been receding at a rapid rate for the past several years, that the supply is inadequate. The Ouachita River would provide a valuable source of water to the industries located near El Dorado and to the city itself if the quality of the water were improved, particularly with respect to the reduction of chlorides discharged from oil fields.

A specific example of benefit by the reduction of municipal pollution exists near Arkadelphia. The Reynolds Aluminum Company plans to use water from the Ouachita River for its new aluminum plant located just south of Arkadelphia. After exhaustive tests to obtain ground water supplies, it was found necessary to draw water from the Ouachita River. Proper disposal of wastes from Arkadelphia would provide a better source of water for the industry at less cost of treatment. The health hazards involved in using polluted water would also be greatly reduced by the proper treatment of sewage from Arkadelphia.

Other direct benefits to industry often result from waste recovery measures. It has been demonstrated in numerous instances that industrial waste treatment often results in the conservation of valuable resources through re-use of raw materials or salvage of by-products. The return flow re-use or sale of recovered material is, in many cases, a direct financial benefit to the industry or contributes to the cost of installation and operation of waste treatment facilities.

Water resources in and near centers of population will be made suitable for recreational development by pollution prevention and abatement. Residents will benefit from greater opportunities to enjoy outdoor recreation and will save appreciably on transportation costs by having facilities near at hand.

The suitability of water for rice irrigation is governed by the concentration of chemical constituents. Among the ions known to be harmful to plants, even at relatively low concentrations, are boron, sodium, the heavy metals, chloride, and sulfate. Protecting the quality of waters used for rice culture in the southeast portion of the basin will benefit the important rice growing industry.

Many of the surface waters now unsuitable for livestock watering will be made suitable for such purposes through pollution prevention and abatement, particularly in those areas affected by salt water from oil fields and wastes from paper and pulp mills.

Pollution abatement, especially as the result of reduction of discharges of harmful industrial wastes, will benefit fishing and other aquatic life in the streams through an improved environment. In several local areas, abatement of pollution will restore sections of streams which have been rendered barren of aquatic life by the discharge of toxic and/or other deleterious wastes from petroleum production and refining operations and a combination of municipal sewage and paper mill and other industrial wastes.

In addition to increasing the recreational opportunities for the inhabitants of the region by developing the fish and wildlife resources, the residents of the basin will benefit by deriving increased enjoyment from the natural beauty of clean streams and lakes.

Pollution abatement and prevention will conserve the vital natural water resources--allowing the residents greater opportunities to benefit from all legitimate water uses.

POLLUTION PREVENTION MEASURES IN EFFECT

Considerable progress in initiating and providing pollution prevention measures is in evidence in the basin. The accomplishments are reflected by the relatively large number of sewage treatment plants installed throughout the basin and the growing interest and practice of disposing of brine from oil fields in injection wells. These pollution abatement facilities are effecting a measurable reduction of the amount of pollution originating from municipal sources and from the operations of the oil industry. Soil conservation practices also have been instituted in several areas to alleviate sediment pollution load carried by the streams.

Data regarding existing municipal waste treatment plants are summarized in Table C and Table 1a in the appendix. Map No. 2 shows the location of existing plants. Forty-three of the 59 municipalities reported as sources of pollution in the basin provide for some degree of treatment of their wastes. Comprising the 16 municipalities listed in Table C as providing no treatment, at present there are four municipalities, all in Arkansas, with five plants under construction. Twenty-eight municipalities have primary treatment plants serving 75,600 persons or 34 percent of the total sewered population, and 15 municipalities have secondary treatment plants serving 79,100 persons or 36 percent of the present sewered population. Camden, Arkansas, has primary treatment for part of the wastes and no treatment for the remaining wastes. Sewage treatment plants under construction at Eudora and Fordyce, Arkansas, will serve an additional 5,500 persons. Thirty-three percent of the present sewered population is not served by treatment works.

Table D shows the status of existing treatment facilities for known sources of industrial pollution which discharge through separate outlets directly into the watercourses. Industries discharging wastes to municipal sewerage systems are not included in the tabulation.

There are 77 known oil production fields which are listed as sources of pollution in the basin. The Arkansas Oil and Gas Commission reports all of the 55 fields in Arkansas have some degree of treatment. However, only 15 of the fields in Arkansas have underground disposal systems and the remaining 40 fields have pits for waste disposal. Underground disposal systems provide a very satisfactory method of pollution abatement since the pollutant does not reach a watercourse. Instead, the re-injection of brine usually serves as an oil conservation measure. Pits, on the other hand, rarely provide adequate protection to the watercourses because of leaks, overflow, and lack of adequate maintenance.

In Louisiana, the Department of Conservation lists five fields that have subsurface injection systems for the control or disposal of wastes; 12 fields are known to have no treatment facilities other than pits, and the remaining five have undetermined treatment facilities.

Of the six oil refineries discharging wastes in the basin, all located in Arkansas, two have treatment facilities and the remaining four have undetermined treatment facilities. Several gasoline and sulphur plants in Arkansas operate in connection with the oil production industries, but no data are available on these industrial. It is believer, however, that they do not produce any appreciable amount of pollution.

The disposal of wastes produced by the oil industry is a major problem in the basin. The Arkansas Oil and Gas Commission, which was established January 1, 1937, is charged with the conservation of oil and gas, and regulates water flooding or repressuring operations in fields in Arkansas that have been developed since the commission was established. Disposal of brines from oil fields developed prior to 1937 presents an economic problem due to the large volume of brine produced in proportion to the relatively small amount of oil produced.

In 1951, 15 controlled fields in Arkansas employed pressure maintenance by injection of water or water and gas in fields in the Ouachita Basin. These fields are: Bear Creek, Cairo Limestone, Mt. Holly, Schuler Jones Sand, Schuler Reynolds, Stephens Hogg Sand, Village Limestone, Wesson Hogg Sand, Schuler Cotton Valley, Schuler Morgan, Village Pettet, Village Sandstone, Village Travis Peak, Nick Springs West, and Wesson Sandstone. In the Village Fields, which contribute brines to Corney and Three Creeks, complete cooperation among the operators has not been accomplished. As a result, the Arkansas Water Pollution Control Commission has initiated legal proceedings to enjoin two operators in the fields to cease polluting by providing facilities for underground disposal of brines.

Oil and gas production in Louisiana is under the supervision of the Division of Minerals, Department of Conservation. The State is divided into five districts and has a district manager residing in each district. Each manager is responsible for maintenance of records on oil production, brine production, brine disposal, and for carrying on inspections of oil production operations.

The known oil fields in the Louisiana portion of the basin that practice subsurface injection, and the percentage of brine disposed underground are as follows: Vixen Gas Field, 100%; Ora Oil Field, 75%; Lake St. John Oil and Gas Field, 90%; Holly Ridge Oil and Gas Field, 83%; and Delhi and West Delhi Oil and Gas Fields, 14%.

Pollution from two paper mills at Bastrop, Louisiana, has been reduced by the installation of more efficient chemical and fiber recovery equipment. Further reduction of pollution is accomplished by an impoundment, completed in the latter part of 1951, with 28,000 acre-feet storage capacity on Bayou La Fourche. Retention of wastes in the impoundment reduces the B.O.D. appreciably. Proper dilution of the wastes is possible by releasing the impounded wastes when adequate stream flow is available.

Four slaughter houses and one poultry plant in Arkansas representing 10 percent of the food industries listed in Arkansas, provide adequate treatment of plant wastes. Treatment at the four small slaughter houses is accomplished by the use of gravel filters recommended by the Arkansas State Board of Health.

The lumber, chemical, and paper plants at Crossett discharge wastes to a large impoundment before they are released by regulated discharge to the Ouachita River. Treatment by natural purification processes is accomplished in the impoundment. Regulated discharges from the impoundment, to provide adequate dilution with water in the Ouachita River, has eliminated fish kills below Crossett. Large investments have been made in the pulp and paper mills at Crossett primarily to provide for increased production and greater recovery of chemicals and fiber. These improvements have also provided pollution abatement by reducing the strength of the waste effluents. The pulp and paper mill at Cullendale provides treatment of its wastes by retention in a lagoon.

Wastes from two bauxite mining and processing plants at Bauxite and barite mining and processing at Malvern and Magnet Cove have been largely controlled by the use of lagoons. Neutralization of acids formed by sulfides leached from the ground and regulation of discharge to provide adequate dilution in the streams is accomplished by these lagoons. In addition, run-off during heavy rains is retarded and the quantity of silt reaching the streams is reduced.

Two refineries in Arkansas have constructed new waste treatment plants. These refineries, located near El Dorado, represent 80 percent of the refinery production capacity in the Arkansas portion of the basin. Facilities for waste treatment at four refineries are undetermined.

The administration and enforcement of existing State anti-pollution laws are important factors in helping prevent pollution of the watercourses.

The Arkansas Water Pollution Control Commission within the State Board of Health has authority and responsibility for water pollution prevention and abatement within the State of Arkansas.

The Louisiana Stream Control Commission has authority and responsibility for water pollution prevention and abatement within the State of Louisiana.

The State Health Departments of both Arkansas and Louisiana have contributed appreciably to pollution abatement through their program activities, and have been responsible for the installation of many municipal sewage treatment plants in the basin. In addition to determining the need for treatment facilities, recommending construction of needed projects, and rendering plant approval services, the departments concern themselves with surveillance over operation of existing plants.

For the purpose of obtaining basic data to aid in determining pollution abatement needs in the basin, the Arkansas Water Pollution Control Commission and the Louisiana Stream Control Commission have conducted studies of pollution problems in their States. Some of these studies supplied information on the efficiency of existing treatment facilities and provided information necessary for the design of new plants or additions and enlargements to existing plants. In Louisiana, intensive studies have been made of the quantities and characteristics of industrial wastes and their effects on the streams.

The number of existing municipal and industrial waste treatment facilities does not necessarily represent a measure of the pollution abated from the watercourses in the basin. The effectiveness of any type of facility is measured by the net result in accomplishing reduction of pollution discharged to the receiving stream.

A large percentage of the existing municipal waste treatment plants has either become obsolete or inadequate for reasons of insufficient capacity, poor maintenance, or neglected operation. The adequacy of existing municipal treatment facilities, with relation to capacity and operation, is shown in Table E. Only 14 plants, or about 27 percent, are adequate as to capacity; and the operation of 21 plants, or 41 percent, is regarded as satisfactory.

Table F shows the adequacy of existing industrial waste treatment facilities in the basin. Of the 76 industrial disposal facilities reported, 54 are adequate as to capacity; and 61 facilities are considered adequate as to operation. It should be pointed out, however, that among the 54 industrial facilities listed as having adequate capacity, there are included 25 oil fields that utilize pits for the disposal of wastes. Though these are considered as adequate facilities at the present time, changing circumstances may cause their early removal from this list.

Gradual continued progress in construction of municipal pollution abatement facilities is in evidence in the basin. The number of plants built in the last five-year period (1947-51, inclusive) is shown in Table G. Information regarding industrial waste treatment facilities constructed during the period is not available. Five municipal waste treatment plants and two known industrial waste treatment facilities are under construction in the basin.

To achieve pollution abatement through the construction of necessary facilities, it is important that the efficiency of any waste treatment plant be maintained by providing proper maintenance and operation of the works. Louisiana conducts an annual training course at Louisiana State Univerisity for water and sewage plant operators in the State.

The Arkansas Water, Sewage, and Industrial Wastes Conference has recently started a voluntary licensing program for sewage plant operators. The services of sanitary engineers from the State Board of Health and other persons are utilized for instruction at regular district meetings

of the conference. Engineers and other personnel of the State Board of Health are available for consultation on plant problems for the purposes of maintaining and improving the efficiency of the pollution abatement facilities in the basin.

TABLE C

EXISTING TREATMENT FACILITIES

MUNICIPAL

Degree of Treatment Provided	Number of Municipalities* Served	Number of Treatment Plants	Population Served
Primary	Ark. 25**	32	65,200
	La. 3	3	10,400
Secondary	Ark. 7	8	56,500
	La. 8	8	22,600
No Treatment	Ark. 7	-	16,700
	La. 9	-	50,200

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers, sanitary wastes discharged by industry directly to watercourse and industrial wastes discharged into municipal sewage systems.

**Camden, Arkansas, has primary treatment for 3,500 persons and no treatment for 6,000 persons.

TABLE D

EXISTING TREATMENT FACILITIES

INDUSTRIAL

Type Industry	Number of Plants	Number of Industrial Plants Having:		
		Treatment Facilities	No Treatment Facilities	Undetermined Facilities
Food & kindred products	Ark. 30	5	13	12
	La. 0	0	0	0
Paper & allied products	Ark. 2	2	0	0
	La. 3	2	1	0
Ordnance & accessories	Ark. 1	1	0	0
	La. 0	0	0	0
Chemical & allied products	Ark. 1	0	0	1
	La. 1	1	0	0
Primary metal ind.	Ark. 3	3	0	0
	La. 0	0	0	0
Oil production ind.	Ark. 55	55	0	0
	La. 22	5	12	5
Products of petroleum	Ark. 6	2	0	4
	La. 0	-	-	-

TABLE E

ADEQUACY OF EXISTING TREATMENT FACILITIES
MUNICIPAL

Number of Municipal Treatment Facilities	Adequacy with Relation to:					
	Capacity			Operation		
	Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Ark. 40	11	29	0	12	28	0
La. 11	3	8	0	9	2	0

TABLE F

ADEQUACY OF EXISTING TREATMENT FACILITIES
INDUSTRIAL

Number of Industrial Treatment Facilities	Adequacy with Relation to:					
	Capacity			Operation		
	Satisf.	Unsatisf.	Undetermined	Satisf.	Unsatisf.	Undetermined
Ark. 68	50	15	3	57	8	3
La. 8	4	4	0	4	0	4

TABLE G

PROGRESS IN CONSTRUCTION OF POLLUTION ABATEMENT FACILITIES

Year	Municipal		Industrial	
	Sewage Treatment Plants Completed	Design Population	Waste Treatment Plants Completed	Amount of Waste Treated (In terms of Equiv. No. People
1947	Ark. 1	11,300	-	-
1948	-	-	-	-
1949*	Ark. 1 La. 1	8,000 4,000	-	-
1950	Ark. 2	18,500	-	-
1951	La. 1	6,000	1	-

* Two temporary plants built to serve 4,000 not included. These are being replaced by new construction.

POLLUTION PREVENTION MEASURES REQUIRED

The present evaluation of pollution prevention measures required in the basin is based on information which was available at the time this report was prepared. The needs considered herein are not intended to be complete and final, but are subject to changes and re-evaluation as additional data become available through future studies and investigations. Assembly of the available data pertaining to all aspects of water pollution has exposed deficiencies in the information and defines a definite need and prerequisite necessary to develop a comprehensive program of water pollution control.

Additional data are particularly needed to determine the pollution discharged to the streams by oil production and refining operations. Studies are needed on numerous tributaries to Smackover, Lapile, and Cornie Creeks in order to determine the extent of pollution prevention measures required for oil field wastes being discharged into the streams.

Although there is a substantial number of waste treatment facilities in the basin, a review of the available data indicates there is an immediate need for improvement projects involving a large percentage of the existing plants and facilities.

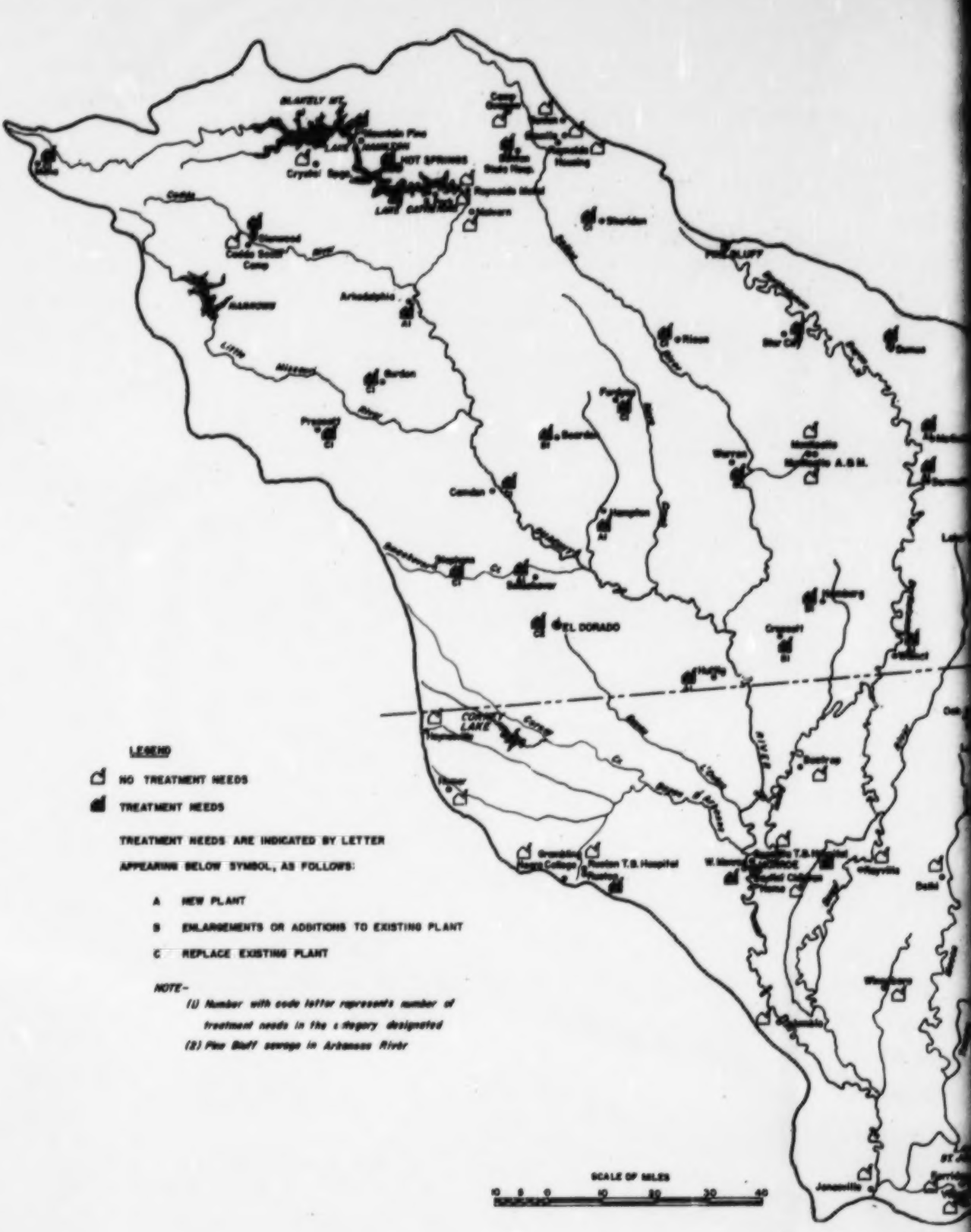
A summary of the municipal waste treatment needs is presented in Table H and Map No. 4. The needs represented include nine new plants to serve a sewered population of 51,800; enlargements or additions to 13 existing plants serving 60,600 persons; and replacement of 13 existing plants serving 46,300 persons. Twenty-seven municipalities serving a population of 62,900 are regarded as requiring no projects.

Table I and Map No. 5 show the industrial waste pollution abatement needs. Specific waste treatment requirements include 20 new plants or other control measures and 20 enlargements or additions to existing plants. Fifty-four industries require no projects, and the needs for 30 industries are undetermined.

Table J shows the currect status of action by municipalities requiring projects for pollution abatement. Sixteen municipalities have taken no action on their needed projects; 13 have projects in the active planning stage; one has final plans approved; and five projects are under construction.

Similar data showing the status of action on industrial pollution abatement needs are contained in Table K. Fourteen industries have taken no action on their needed projects; six industries have projects in the active planning stage; two industries have projects under construction; and the status of action on pollution abatement needs for 48 industries is undetermined.

Table L is a project list for individual municipalities and known industries needing improvements or having undetermined needs for abatement of pollution.

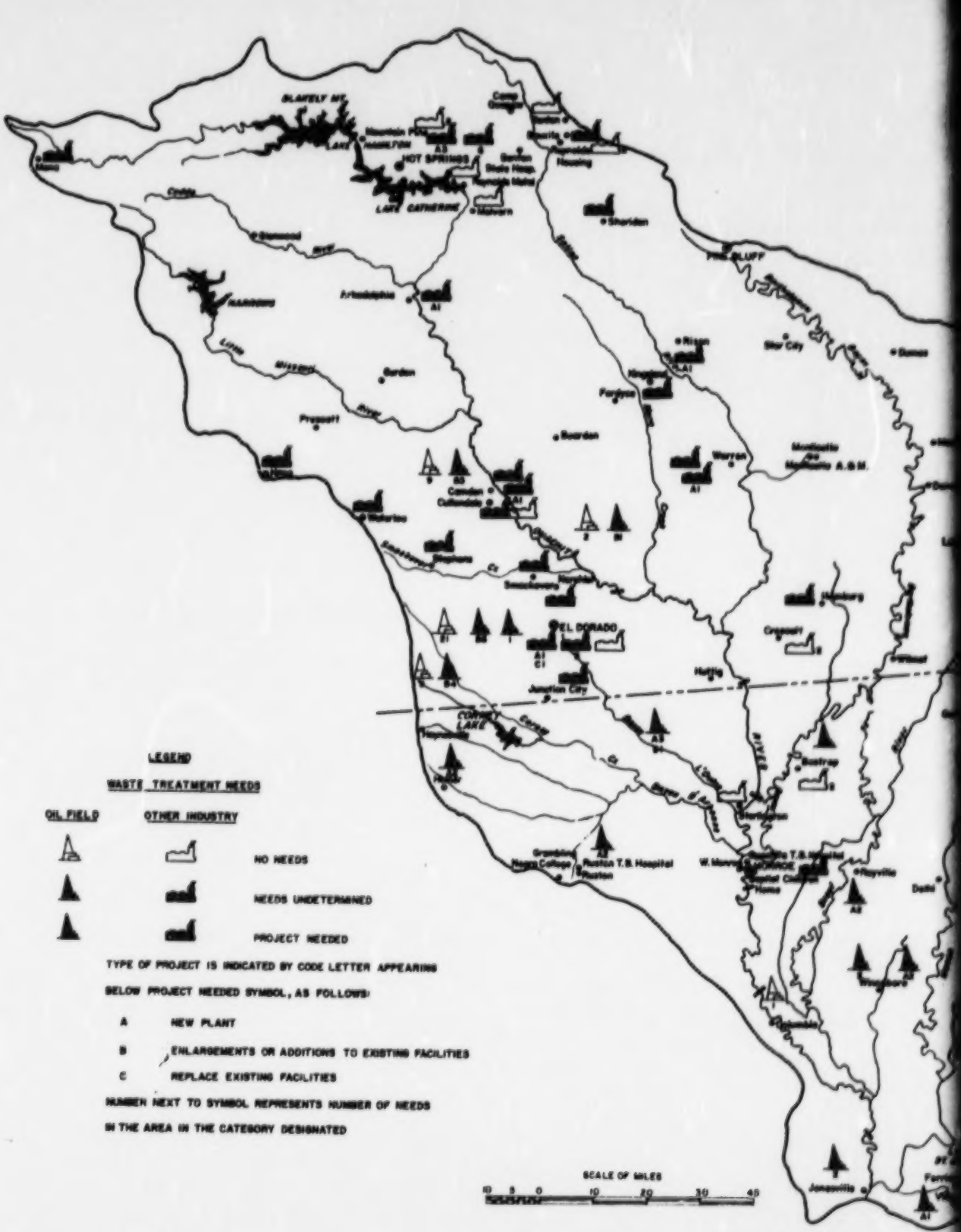

LEGEND
NO TREATMENT NEEDS
TREATMENT NEEDS
TREATMENT NEEDS ARE INDICATED BY LETTER APPEARING BELOW SYMBOL, AS FOLLOWS:
A NEW PLANT
B ENLARGEMENTS OR ADDITIONS TO EXISTING PLANT
C REPLACE EXISTING PLANT
NOTE-
(1) Number with code letter represents number of treatment needs in the category designated
(2) Pine Bluff sewage in Arkansas River
EL DORADO
CORNING
SCALE OF MILES

OUACHITA RIVER BASIN

MUNICIPAL

WASTE TREATMENT NEEDS

FEDERAL SECURITY AGENCY
Public Health Service
Division of Water Pollution Control
MAP NO. 4


LEGEND
WASTE TREATMENT NEEDS
OIL FIELD
OTHER INDUSTRY
NO NEEDS
NEEDS UNDETERMINED
PROJECT NEEDED
TYPE OF PROJECT IS INDICATED BY CODE LETTER APPEARING
BELOW PROJECT NEEDED SYMBOL, AS FOLLOWS:
A NEW PLANT
B ENLARGEMENTS OR ADDITIONS TO EXISTING FACILITIES
C REPLACE EXISTING FACILITIES
NUMBER NEXT TO SYMBOL REPRESENTS NUMBER OF NEEDS
IN THE AREA IN THE CATEGORY DESIGNATED
SCALE OF MILES
10 5 0 10 20 30 40
EL DORADO
HOT SPRINGS
LAKE CATHERINE
CAMDEN
MAGNOLIA
STAMPS
JONESBORO

OUACHITA RIVER BASIN

INDUSTRIAL POLLUTION ABATEMENT NEEDS

FEDERAL SECURITY AGENCY
Public Health Service
Division of Water Pollution Control
MAP NO. 6

It is estimated that the initial cost for providing the municipal waste treatment facilities needed in the basin will amount to approximately $4,500,000. This estimate is based on average construction costs considered reasonable for the region, but should be regarded with reservation to allow for re-evaluation of needs as more complete and specific data become available.

The lack of adequate data regarding industrial pollution and the complexities involved in determining the type and magnitude of waste disposal facilities needed precludes an estimate of cost for providing industrial waste treatment projects.

Additional studies are needed to determine the characteristics and volumes of wastes discharged from industrial sources, particularly for refineries and oil fields.

Near Malvern and Magnet Cove, Arkansas, leaching from barite mines cause damage to fish and other aquatic life. Additional control measures are needed to reduce the amount of silt and dissolved minerals coming from these mining operations. Greater control of acid wastes contained in leaching from the bauxite mines near Benton, Arkansas, is needed to protect the water quality of the Saline River for all water uses. Additional data are also needed to determine the effects of pulp mill wastes discharged to the watercourses particularly as they affect the normal fish populations in the streams and the recovery capacities of those streams.

Pollution due to sediment is not extensive, though in some local areas damages are apparent and prevention measures are needed. Control measures for the reduction of silt and other solids are needed in the lower Ouachita where dredging of the navigation channels is required annually.

The need for public support is essential for the promotion of a water pollution control program. Although the public is generally aware of pollution in the streams of the basin, the majority are not fully cognizant of the extent of pollution, of the damages resulting from pollution to all water uses, or the benefits accruing from restoration and protection of the waters for productive uses. A program of public education reaching citizens in all walks of life would serve to create greater public demand for pollution abatement in the basin and in the States generally. As a part of a general educational program there should be an expanded program for training of treatment works operators as a step in achieving maximum benefits from existing and new pollution abatement facilities.

TABLE H

WASTE TREATMENT NEEDS - MUNICIPAL

Needs	Number	Population Served by Facilities
New Plant	Ark. 7 La. 2	16,700 35,100
Enlargement or Additions to Existing Plant	Ark. 14 La. 2	51,400 9,200
Replace Existing Plant	Ark. 13 La. 0	46,300 0
No Project Required	Ark. 11 La. 16	24,000 38,900
Undetermined	Ark. 0 La. 0	0 0

TABLE I

INDUSTRIAL WASTE POLLUTION ABATEMENT NEEDS

Needs	Number
New Treatment Plant or other Pollution Control Measures	Ark. 8 La. 12
Enlargement or Additions to Existing Plant	Ark. 15 La. 5
Replace Existing Plant	Ark. 0 La. 0
Connection to Municipal Sewer System	Ark. 0 La. 0
No Project Required	Ark. 50 La. 4
Undetermined	Ark. 25 La. 5

TABLE J

CURRENT STATUS OF MUNICIPAL ACTION ON

POLLUTION ABATEMENT NEEDS

Status of Action	Number of Municipalities
Inactive	Ark. 14 La. 2
Active Planning	Ark. 11 La. 2
Final Plans Approved	Ark. 1 La. 0
Under Construction	Ark. 5 La. 0

TABLE K

CURRENT STATUS OF INDUSTRIAL ACTION ON

POLLUTION ABATEMENT NEEDS

Status of Action	Number of Industries
Inactive	Ark. 13 La. 1
Active Planning	Ark. 6 La. 0
Final Plans Approved	Ark. 0 La. 0
Under Construction	Ark. 2 La. 0
Undetermined	Ark. 27 La. 21

TABLE L

MUNICIPALITIES AND INDUSTRIES NEEDING IMPROVEMENTS FOR ABATEMENT OF POLLUTION

Name and Location	Population Served	Improvements Needed*	Remarks
ARKANSAS			
Municipalities			
Arkadelphia	6,000	NP	Active planning
Bearden	1,000	E-A	
Benton State Hospital	2,000	R	
Camden	9,500	R	Active planning; to connect 6,000 population to plant
Crossett	4,000	E-A	
Dermott	3,000	NP	
Lamar	2,000	E-A	Active planning
El Dorado	20,000	2 R	Under construction; 6 primary plants being replaced with 2 plants
Eudora	2,500	R	Under construction; design population 4,000; plant cost $80,000
Fordyce	3,000	R	Under construction; 2 plants to be replaced with 1; design population 13,000; plant and system cost $235,000
Glenwood	800	E-A	Needs secondary treatment
Gurdon	2,000	R	Active planning
Hot Springs #1	30,000	E-A	Active planning
#2	7,000	E-A	Active planning
Hamburg	2,000	E-A	Plans approved
Hampton	800	NP	Active planning
Lake Village	1,500	R	
Mena	2,000	R	Needs secondary treatment
McGehee	3,000	NP	Active planning
Mt. Pine	1,200	R	
Huttig	1,400	NP	
Monticello A & M College	600	E-A	Active planning

TABLE L cont'd

MUNICIPALITIES AND INDUSTRIES NEEDING
IMPROVEMENTS FOR ABATEMENT OF POLLUTION

Name and Location	Population Served	Improvements Needed (*)	Remarks
Rison	800	R	Active planning
Sheridan	1,000	R	
Smackover	2,000	NP	
Star City	1,000	E-A	Active planning
Stephens	800	R	
Warren (1)	1,500	E-A	
(2)	1,500	E-A	
Wilmot	500	NP	
Industries			
Berry Asphalt Co. (Waterloo)		Und.	
Berry Asphalt Co. (Stephens)		Und.	
Henry H. Cross Co. (Smackover)		Und.	
MacMillan Petroleum Corp. (Norphlet)		Und.	
1 Oil field		Und.	
6 Oil fields (Union Co.)		E-A	
4 Oil fields (Columbia Co.)		E-A	
3 Oil fields (Ouachita Co.)		E-A	
1 Oil field (Calhoun Co.)		E-A	
Southwestern Pkg. Co. (Hope)		Und.	
Boswell Sltg. House (Camden)		NP	
Gillispie Sltg. House (Camden)		Und.	
Dumas Sltg. House (El Dorado)		NP	

TABLE L cont'd

MUNICIPALITIES AND INDUSTRIES NEEDING
IMPROVEMENTS FOR ABATEMENT OF POLLUTION

Name and Location	Population Served	Improvements Needed (*)	Remarks
Lawton Sigt. House (Warren)		NP	
Bell Sigt. House (Rison)		NP	
Frank Reader Sigt. House (Arkadelphia)		NP	
Golden Bros. Sigt. House (Hamburg)		Und.	
Sanders Milk & Ice Cream Co. (Hot Springs)		Und.	
Humphreys (Hot Springs)		Und.	
Connerly (Hot Springs)		Und.	
Burns Milk Plant (El Dorado)		Und.	
Heath Bros. Milk Plant (Mena)		Und.	
Sikes Bros. Milk Plant (Sheridan)		Und.	
Garland Co. Poultry Plt. (Hot Springs)		NP	
Hughes Turkey Farm (Hot Springs)		NP	
Moore & Son Poultry Plt. (Hot Springs)		NP	
Musachia Poultry Plt. (Hot Springs)		Und.	
Shepherd Poultry Plt. (Hot Springs)		Und.	
Wages Poultry Plt. (Junction City)		Und.	
Wallis & Fish Poultry Co. (El Dorado)		Und.	
Blair Poultry Plant (Hot Springs)		Und.	

TABLE L cont'd

MUNICIPALITIES AND INDUSTRIES NEEDING
IMPROVEMENTS FOR ABATEMENT OF POLLUTION

Name and Location	Population Served	Improvements Needed*	Remarks
Garland Co. Poultry & Egg Co. (Hot Springs)		Und.	
Carasey Poultry Plant (Warren)		Und.	
Schwarzlose Turkey Plant (Kingsland)		Und.	
Reynolds Metal Plant (Bauxite)		Und.	
Lion Chemical Plant (El Dorado)		Und.	
Camden Paper Mill (Cullendale)		Und.	
LOUISIANA			
Municipalities			
West Monroe	9,800	NP	
Monroe	25,300	NP	
Oak Grove	1,200	E-A	
Ruston	8,000	E-A	
Industries			
Brown Paper Company (Monroe)		Und.	
2 fields (Richland Parish)		2 NP	975 bbls. brine/day
2 fields		2 NP	32 bbls. brine/day
2 fields (Franklin Parish)		2 Und.	
1 field (Tensas Parish)		E-A	5,000 bbls. brine/day
2 fields (Catahoula Parish)		2 Und.	
2 fields (Lincoln Parish)		2 NP	115 bbls. brine/day
1 field (Claiborne Parish)		2 NP	135 bbls. brine/day
3 fields		3 NP	1,585 bbls. brine/day
1 field (Union Parish)		E-A	12,000 bbls. brine/day

TABLE L cont'd

MUNICIPALITIES AND INDUSTRIES NEEDING
IMPROVEMENTS FOR ABATEMENT OF POLLUTION

Name and Location	Population Served	Improvements Needed*	Remarks
1 field (Concordia Parish)		NP	150 bbls. brine/day
1 field (Union, Ouachita, and Morehouse Parishes)		Und.	
1 field (Claiborne and Lincoln Parishes)		NP	517 bbls. brine/day
1 field (Tensas and Concordia Parishes)		E-A	15,750 bbls. brine/day
1 field (Franklin, Madison, and Richland Parishes)		E-A	2,200 bbls. brine/day

* NP - New Plant
E-A - Enlargement or Addition to Existing Plant
R - Replacement of Existing Plant
Und. - Undetermined

TABLE 1a
BASIC DATA ON SOURCES OF MUNICIPAL POLLUTION
OUACHITA RIVER BASIN
June, 1952

Watercourse -- Municipality	River Mile 1/	Population Served by Sewers	P.E. (B.O.D.) Untreated Wastes	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) Disch'd to Watercourse	Treatment Needs	Current Status Municipal Action
					Cap'ty	Opr.			
ARKANSAS			(Est.)				(Est.)		
OUACHITA R. (Main Stem)									
Prairie Cr.									
Ward's Cr.									
Mena		2,000	2,000	Primary	Unsat.	Unsat.	1,400	R	Inactive
Glazypeau Cr.	484								
Mt. Pine	-	1,200	1,200	Primary	Unsat.	Unsat.	850	R	Inactive
Creek									
Scout Camp (Crystal Springs)		350	350	Primary	Sat.	Sat.	250	None	
LAKE HAMILTON									
Hot Springs Cr.									
Hot Springs #1	481.6	30,000	30,000	Secondary	Unsat.	Unsat.	9,000	E-A	Active Planning
LAKE CATHERINE									
Gulpha Cr.									
Hot Springs #2	481.0	7,000	7,000	Secondary	Unsat.	Unsat.	2,100	E-A	Active Planning
OUACHITA R. (Main Stem)									
Little Horgan Cr.									
Lake Catherine State Park		200	200	Primary	Sat.	Unsat.	150	None	

1/ Miles from mouth of Black River.

TABLE 1a Continued

Watercourse -- Municipality	River Mile 1/	Population Served by Sewers	P.E. (B.O.D.) Untreated Wastes	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) Disch'd to Water-course	Treatment Needs	Current Status Municipal Action
					Cap'ty	Opr.			
			(Est.)				(Est.)		
Branch									
Malvern	450.1	6,500	6,500	Secondary	Sat.	Sat.	1,800 (act.)	None	
Reynolds Metals (Jones Mills)		300	300	Secondary	Sat.	Sat.	100	None	
Caddo R.	426.0								
Glenwood		800	800	Primary	Unsat.	Unsat.	550	E-A	Inactive
Caddo Scout Camp		150	150	Primary	Sat.	Sat.	100	None	
Arkadelphia	420.6	6,000	6,000	None			6,000	NP	Inactive
L. Missouri R.	380								
Terre Noire Cr.									
L. Caney Cr.									
Gurdon		2,000	2,000	Primary	Unsat.	Unsat.	1,400	R	Inactive
Terre Rouge Cr.									
Prescott		3,500	3,500	Primary	Unsat.	Sat.	2,500	R	Under const.
Camden (a)	354.1	3,500	3,500	Primary	Unsat.	Unsat.	2,500	R	Active planning
(b)	354.1	6,000	6,000	None			6,000		Plan to connect to (a) plant
Two Bayou Cr.	346.0								
Bearden		1,000	1,000	Primary	Unsat.	Unsat.	700	E-A	Inactive
Smackover Cr.	313.0								
Stephens		800	800	Primary	Unsat.	Unsat.	550	R	Inactive
Smackover		2,000	2,000	None			2,000	NP	Inactive

Table 1a Continued

Watercourse -- Municipality	River Mile 1/	Population Served by Sewers	P.E. (B.O.D.) Untreated Wastes	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) Disch'd to Watercourse	Treatment Needs	Current Status Municipal Action
					Cap'y	Opr.			
			(Est.)				(Est.)		
Champagnolle Cr.	310.0								
Hampton		800	800	None			800	NP	Active planning
Moro Cr.	287.0								
Jug Cr.									
Fordyce #1		1,000	1,000	Primary	Unsat.	Unsat.	700	R	Under const. One plant to replace two plants.
Acerman Cr.									
Fordyce #2		2,000	2,000	Primary	Unsat.	Unsat.	1,400		
Saline River	256.0								
Scout Camp									
Quapaw		300	300	Primary	Sat.	Sat.	200	None	
Benton		6,000	6,000	Secondary	Sat.	Sat.	1,800	None	
Benton State Hosp.		2,000	2,000	Primary	Unsat.	Unsat.	1,400	R	Inactive
Holly Cr.									
Bauxite		1,200	1,200	Secondary	Sat.	Sat.	350	None	
Hurricane Cr.									
Reynolds Metals Housing (Bauxite)		1,500	1,500	Secondary	Sat.	Sat.	450	None	
Sheridan		1,000	1,000	Primary	Unsat.	Sat.	700	R	Inactive
Rison		800	800	Primary	Unsat.	Unsat.	550	R	Inactive
Town Branch									
Warren #1		1,500	1,500	Primary	Unsat.	Unsat.	1,100	E-A	Inactive
Hardlaw Cr.									
Warren #2		1,500	1,500	Primary	Unsat.	Unsat.	1,100	E-A	Inactive
Cypress Cr.									
Monticello		4,000	4,000	Secondary	Sat.	Sat.	1,200	None	
Creek									
Monticello A&M College		600	600	Primary	Unsat.	Sat.	400	E-A	Active planning

TABLE 1a Continued

Watercourse -- Municipality	River Mile 1/	Population Served by Sewers	P.E. (B.O.D.) Untreated Wastes (Est.)	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) Disch'd to Watercourse (Est.)	Treatment Needs	Current Status Municipal Action
					Cap'y	Opr.			
Coffee Cr.									
Crossett		4,000	4,000	Primary	Unsat.	Sat.	2,800	E-A	Inactive
Clear Lake									
Buck Horn Slough									
Buttig		1,400	1,400	None			1,400	NP	Inactive
Bayou Bartholomew	210.0								
Cane Cr.									
Star City		1,000	1,000	Primary	Unsat.	Unsat.	700	E-A	Active Planning
Creek									
Dumas		2,000	2,000	Primary	Unsat.	Unsat.	1,400	E-A	Inactive
Dermott		3,000	3,000	None			3,000	NP	Inactive
Wilmot		500	500	None			500	NP	Inactive
Chemin Haut Cr.									
Hamburg		2,000	2,000	Primary	Unsat.	Unsat.	1,400	E-A	Plans approved
Bayou DeLoutre	204.0								
El Dorado #1		6,000	6,000	Primary	Unsat.	Unsat.	5,400	2 R	Active planning
#2		6,000	6,000	Primary	Unsat.	Unsat.	5,400		to combine
#3		3,000	3,000	Primary	Unsat.	Unsat.	2,700		plants
#4		1,000	1,000	Primary	Unsat.	Unsat.	900		
El Dorado									
Harrell Addn.		2,000	2,000	Primary	Unsat.	Unsat.	1,800		
Shilling Addn.		2,000	2,000	Primary	Unsat.	Unsat.	1,800		
Boeuf River	81.0								
Big Bayou									
McGehee		3,000	3,000	None			3,000	NP	Inactive
Tensas R.	56.7								
Bayou Macon									

TABLE 1a Continued

Watercourse -- Municipality	River Mile 1/	Population Served by Sewers	P.E. (B.O.D.) Untreated Wastes	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) Disch'd to Watercourse	Treatment Needs	Current Status Municipal Action
					Cap'y	Opr.			
			(Est.)				(Est.)		
L. Lake Bayou									
Lake Village		1,500	1,500	Primary	Unsat.	Unsat.	1,100	R	Inactive
Eudora		2,500	2,500	Primary	Unsat.	Unsat.	1,800	R	Under constr.
LOUISIANA									
OUACHITA R. (Main Stem)									
Bayou Bartholomew	210.0								
Paper Mill Ditch									
Bastrop		9,000	9,000	Primary	Sat.	Sat.	6,300	None	
Bayou DeLoutre									
Bayou D'Arbonne									
Haynesville		2,600	2,600	Secondary	Sat.	Sat.	800	None	
Homer		3,500	3,500	Secondary	Sat.	Unsat.	1,100	None	
Grambling College		1,800	1,800	Secondary	Sat.	Sat.	550	None	
Ruston		8,000	8,000	Secondary	Unsat.	Sat.	2,400	E-A	Active planning
Ruston T.B. Hosp.		400	400	Secondary	Sat.	Sat.	100	None	
Ouachita T. B. San.		50	50	Secondary	Sat.	Sat.	(Insignificant)	None	
Monroe	183.7	25,300	25,300	None			25,300	NP	Inactive
W. Monroe		9,800	9,800	None			9,800	NP	Inactive
E. Monroe (Baptist Children's Home)		200	200	Primary	Sat.	Sat.	100	None	
Columbia		1,100	1,100	None				None	
Boeuf River	81.0								
Rayville		3,500	3,500	None			3,500	None	
Turkey Cr.									
Winnsboro		2,200	2,200	Secondary	Sat.	Unsat.	650	None	

TABLE 1a Continued

Watercourse -- Municipality	River Mile 1/	Population Served by Sewers	P.E. (B.O.D.) Untreated Wastes	Waste Treatment Provided	Adequacy of Treatment Facilities		P.E. (B.O.D.) Disch'd to Watercourse	Treatment Needs	Current Status Municipal Action
					Cap'ty	Op'n			
			(Est.)				(Est.)		
Tensas River									
Tallulah		3,000	3,000	None			3,000	None	
Bayou Macon									
Oak Grove		1,200	1,200	Primary	Sat.	Sat.	850	E-A	Active planning
Delhi		2,700	2,700	None			2,700	None	
BLACK RIVER (Main Stem)									
Jonesville		700	700	None			700	None	
MISSISSIPPI RIVER									
Lake Providence		3,500	3,500	None			3,500	None	
Vidalia		600	600	None			600	None	
OUACHITA RIVER (Main Stem)									
Tensas River									
Bayou Coccodrie									
Ferriday		4,000	4,000	Secondary	Sat.	Sat.	1,200	None	